

# TARDEC's Ground Vehicle Power and Energy Overview to Michigan Defense and Innovation Symposium



***TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.***

**TARDEC Research Business Group**  
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17 November 2008

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Report Documentation Page			Form Approved OMB No. 0704-0188		
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1. REPORT DATE <b>17 NOV 2008</b>		2. REPORT TYPE <b>N/A</b>		3. DATES COVERED <b>-</b>	
4. TITLE AND SUBTITLE <b>TARDEC's Ground Vehicle Power and energy Overview</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) <b>Paul Rogers</b>				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>US Army RDECOM-TARDEC 6501 E 11 Mile Rd Warren, MI 48397-5000</b>				8. PERFORMING ORGANIZATION REPORT NUMBER <b>19419</b>	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S) <b>TACOM/TARDEC</b>	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S) <b>19419</b>	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release, distribution unlimited</b>					
13. SUPPLEMENTARY NOTES <b>Presented at the Michigan Defense and Innovation Symposium, 17-18 November 2008, Livonia, Michigan, USa, The original document contains color images.</b>					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>SAR</b>	18. NUMBER OF PAGES <b>10</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			



# Tank Automotive Research, Development & Engineering Center (TARDEC)



A major element of RDECOM and partner in the TACOM Life-Cycle Management Command:

- ***DoD's Ground Vehicle Center of Excellence***
- Provides ***full life-cycle engineering*** support provider-of-first-choice for ***all DOD*** ground combat and combat support weapons and vehicle systems.
- Develops and integrates ***the right technology solutions*** to improve Current Force effectiveness and provide superior capabilities for the Future Force.



Responsible for Research, Development and Engineering Support to **2,800** Army systems and many of the Army's and DOD's Top Joint Warfighter Development Programs

## Battlefield consumption of energy increasing

- New C4ISR technologies
- IED Defeat Systems
- New weapons (EM guns, lasers)

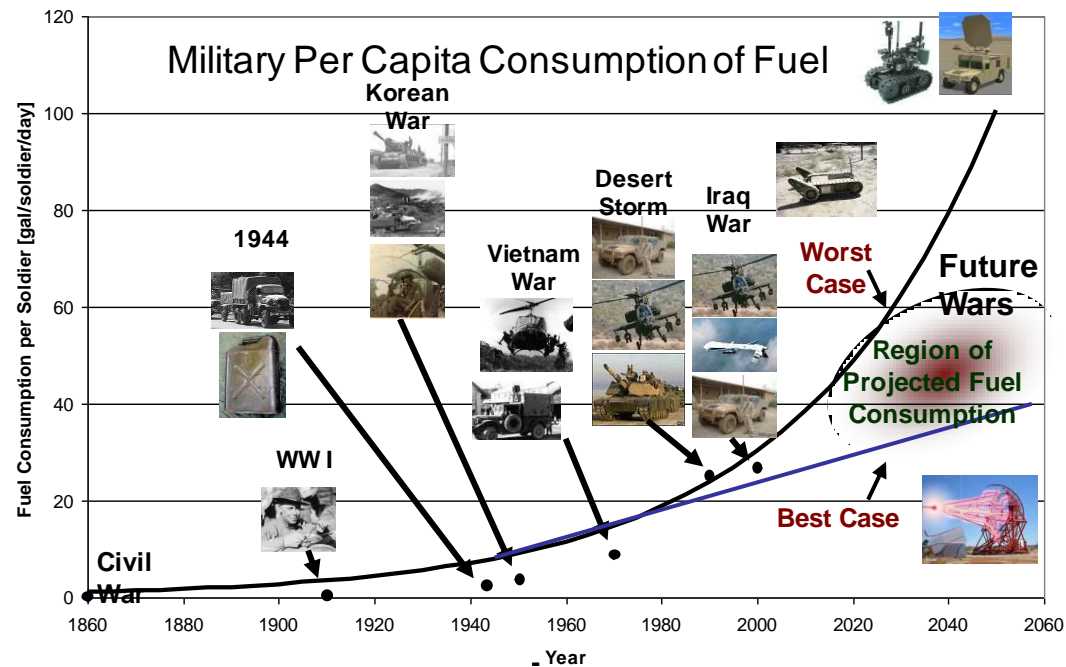
## Energy security problematic

- Cost of fuel skyrocketing
- Alternative sources sought – wind, solar, bio-mass, waste to energy

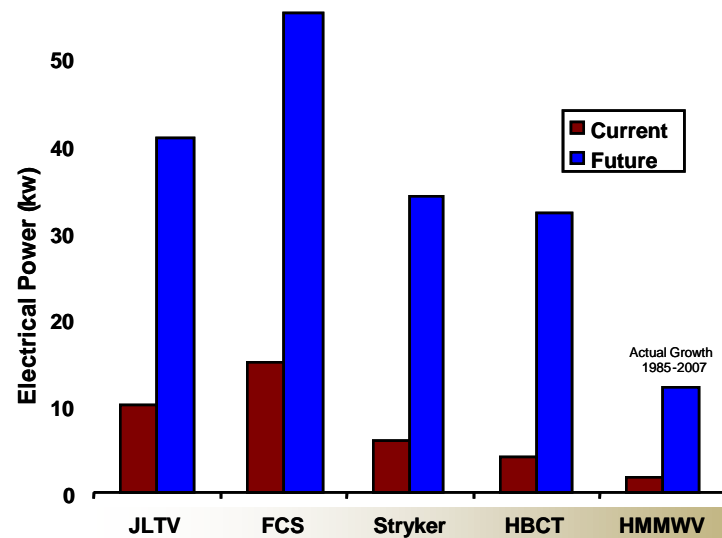
## Operational issues

- Battery usage & limitations – energy & power density
- Demand for auxiliary power on-board vehicles
- Emphasis on silent (“quiet”) watch
- Unmanned vehicles (air/ground)
- Unattended sensors
- Inefficient management/ distribution of power
- Demand for soldier-wearable power

## Increased emphasis on system power metrics and energy efficiency (KPPs, low consumption components)

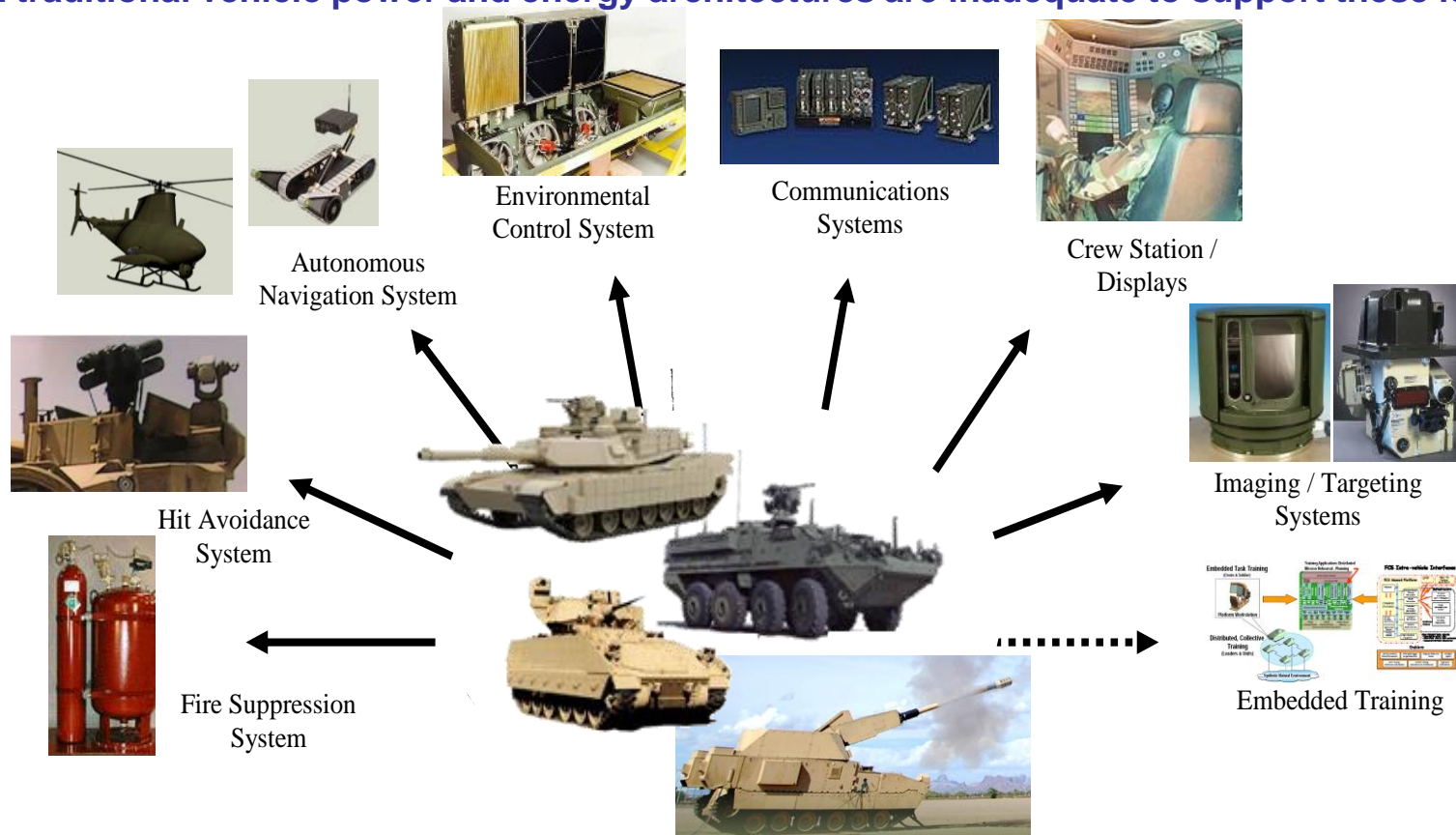


Estimated Electrical Power Growth



# Army Ground Vehicle Power and Energy Design Drivers

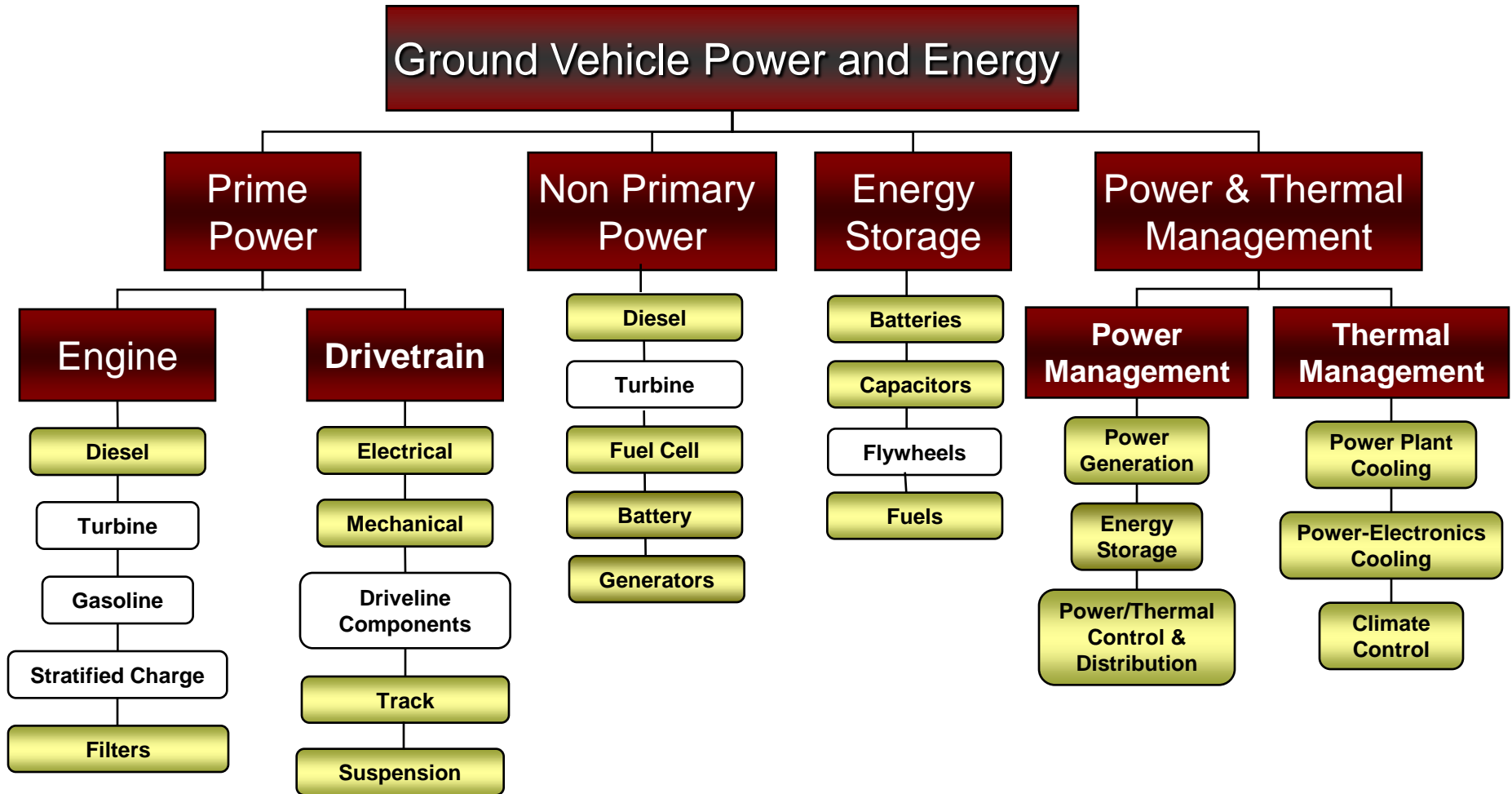
Advanced survivability, weapons and C4ISR equipment are driving vehicle power demands dramatically higher... traditional vehicle power and energy architectures are inadequate to support these loads.



The current force is modernizing to fight along side FCS bringing with it the tremendous power and thermal burdens associated with the advanced technology

As the Army transforms the Current to the Future Force, significant technical challenges in power and energy must be overcome to enable the Warfighter with its superior capability

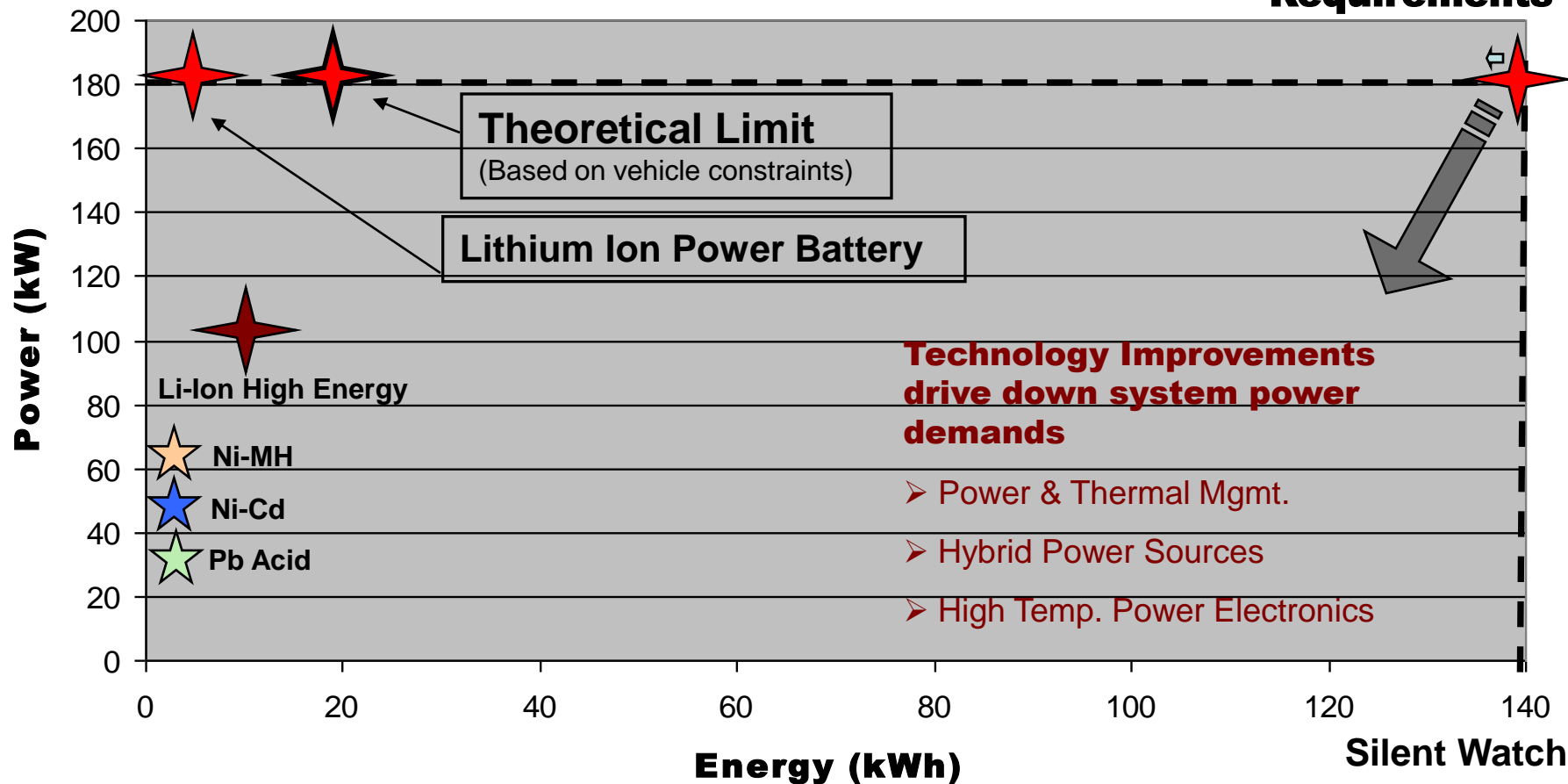




Peak Power

Energy vs. Power

Future System Requirements



- A holistic system level approach is required to achieve the future military ground vehicle power and energy requirements focusing both on reducing the power demand and improving the power and energy supply.
- TARDEC is strategically aligning their project portfolio to focus on these issues and provide the Warfighter with integrated technology solutions.





<http://contracting.tacom.army.mil/opportunity.htm>

Questions to answer before approaching TARDEC:

- What TRL is my technology at?
- Am I willing to disclose enough test data to make my case?
- Is there other funding that can be leveraged?
- Do I have other federal funding working this technology, and who are the POC's?
- Does my accounting system restrict what federal contracts I can be awarded?
- Do I qualify for special consideration? (Small business, woman / minority owned, 8A, hub zone...)

*Federal employees do not sign NDA's because federal law carries **criminal** penalties for disclosure*

CRADA'S

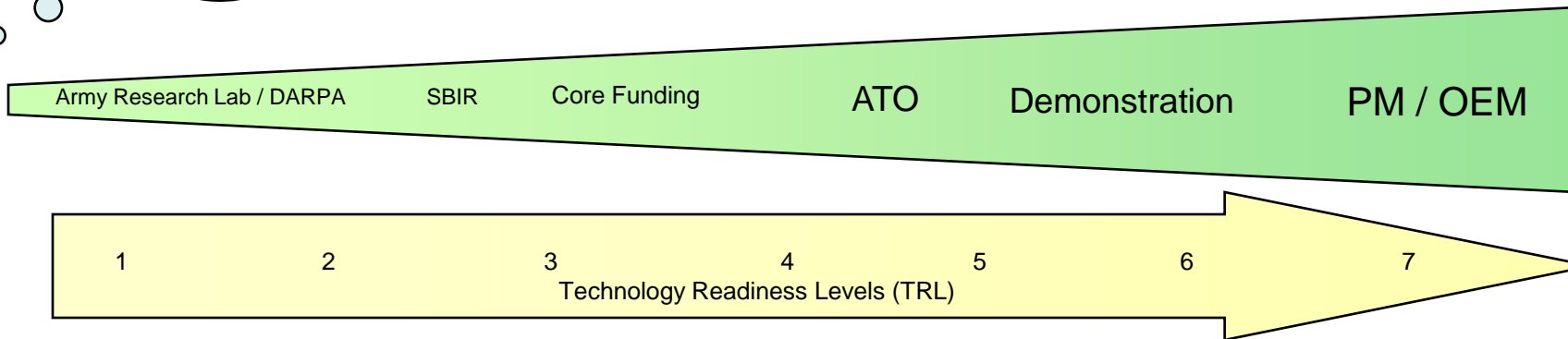
COOPERATIVE AGREEMENTS

CONTRACTS

Regulatory Guidance:

- FAR (Federal Acquisition Regulation)
- DFARS (Defense Federal Acquisition Regulation Supplement)
- DODGARS (DoD Grants and Regulatory System)
- ITAR (International Traffic in Arms Regulations)
- EAR (Export Administration Regulations)

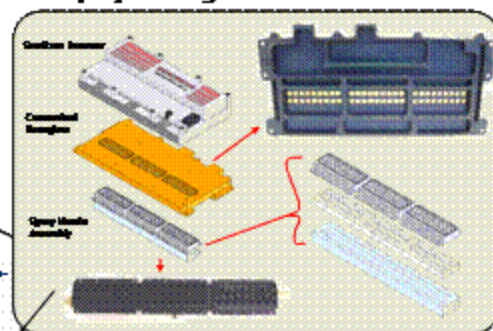
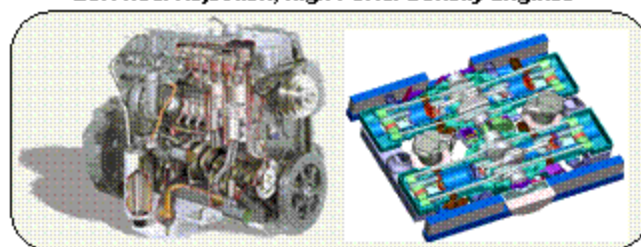
*Where do I enter the acquisition cycle?*



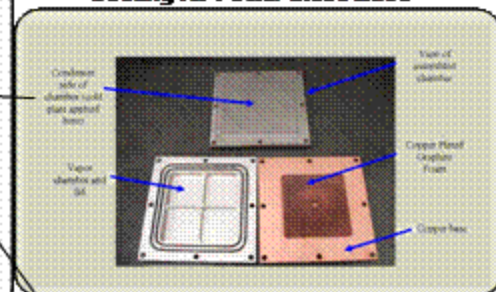
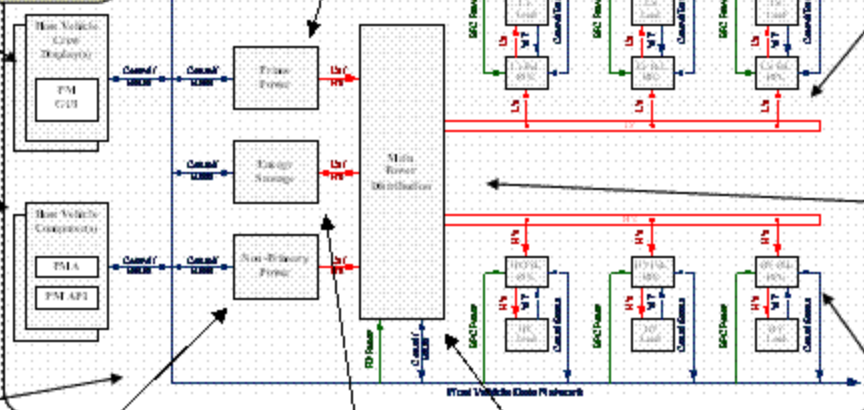
# Back-Up

### Low Heat Rejection, High Power Density Engines

## Spray Cooling for Power Electronics



## Carbon Foam and Phase Change Cooling for Power Electronics



## Integrated Power and Thermal Architecture Optimizing Platform Energy Efficiency

